

# Vitamins C and E linked to metabolic syndrome in low-income Ecuadorians

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With life expectancy increasing in Latin America, age-related disease has become a pressing public health concern. Results of an epidemiological study conducted by researchers at the Jean Mayer USDA Human Nutrition Research Center on Aging (USDA HNRCA) at Tufts University and the Corporacion Ecuatoriana de Biotecnologia showed that the metabolic syndrome, a condition that increases a person's risk of developing cardiovascular disease and type 2 diabetes, was prevalent in a low-income urban community in Ecuador and that a poor diet low in micronutrients appeared to contribute.

The study enrolled 225 women and 127 men age 65 and older, living in three low-income neighborhoods on the outskirts of Quito, the capital of Ecuador. The authors examined the relationship between the [metabolic syndrome](#) and micronutrients such as folate, zinc and vitamins C, B12 and E. The participants reported their food intake in biweekly interviews and provided blood samples.

Using the International Diabetes Foundation (IDF) definition, the authors determined that 40 % of the population had the metabolic syndrome, with a disproportionate number of women affected: 81 % compared to 19% of the men, which the authors attribute to more of the women being overweight. According to the IDF, the metabolic syndrome is present in centrally obese men and women, as defined by hip and waist measurements, with at least two of the four following metabolic risk factors: raised triglycerides, reduced high-density lipoprotein (HDL) cholesterol, raised blood pressure, and raised fasting [plasma glucose](#)

(blood sugar).

"In this population of low-income Ecuadorians, we observed a pattern of [high carbohydrate](#), high sodium diets lacking in healthy fats and good sources of protein. Our blood analyses indicates a significant number of participants weren't consuming enough of a range of micronutrients," says senior author Simin Nikbin Meydani, PhD, DVM, director of the USDA HNRCA and the Nutritional Immunology Laboratory at the USDA HNRCA. "After adjusting for age and sex, we observed significant relationships between the metabolic syndrome and two of the micronutrients, vitamins C and E."

"As a group, the participants did not exhibit low blood levels of vitamin E," Meydani continues. "The association suggests that having higher blood levels of vitamin E may protect against the metabolic syndrome." However, low blood levels of vitamin C were seen in 82% of the participants, which the authors suspect was due to limited intake of fresh fruits and vegetables. The bulk of the participants' calories came from white rice, potatoes, sugar and white bread. The authors noted 55% of the women and 33% of the men were overweight.

"With high-calorie foods lacking essential nutrients serving as pillars of the diet, it is possible to be both overweight and malnourished," Meydani says. "Our data suggests that limited consumption of nutrient dense foods such as chicken, vegetables and legumes makes this small population of Ecuadorian elders even more susceptible to the metabolic syndrome."

Additionally, Meydani and colleagues observed a significant relationship between the metabolic syndrome and C-reactive protein (CRP), a marker of low-grade inflammation that has been associated with cardiovascular disease risk. High CRP blood concentrations were seen in almost half of the population.

The results, published online ahead of print in the journal *Public Health Nutrition*, build on the authors' previous observational study which noted a high prevalence of two metabolic risk factors -elevated waist circumference and low HDL cholesterol levels- in a population of low income, older Ecuadorian adults.

Meydani, who is also a professor at the Friedman School of Nutrition Science and Policy and the Sackler School of Graduate Biomedical Sciences at Tufts, says the results of the present study are a preliminary step toward understanding metabolic disease risk in older adults living in impoverished areas of Latin America. "To our knowledge, there are few studies of the metabolic syndrome in Latin America. Additional research is needed to affirm that there is a relationship between vitamins C and E intake and the metabolic syndrome and CRP and the metabolic syndrome," she says. "This requires interventional studies in larger, more economically diverse populations of older, Latin American men and women."

Meydani and colleagues view nutrition intervention as a potential strategy for curbing metabolic risk in Latin America. "Presently, there are about 59 million Latin American and Caribbean men and women over the age of 60 and the United Nations predicts the population will reach 101 billion by 2025," Meydani says. "Medical resources are minimal in developing countries and those that are in place are usually not directed toward older adults. Nutrition interventions, such as encouraging older adults to consume more nutrient dense foods, for example, locally grown produce, could reduce the strain on the health care system."

**More information:** Sempertegui, F, Estrella B, Tucker KL, Hamer DH, Narvaez X, Sempertegui, M, Griffiths JK, Noel SE, Dallal GE, Selhub, J and Meydani SN. "Metabolic syndrome in the elderly living in marginal peri-urban communities in Quito, Ecuador." *Public Health*

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